



# Spectral Gamma-Ray Borehole Log Data Report

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Borehole

# 50-04-07

Log Event A

## Borehole Information

Farm : <u>T</u>	Tank : <u>T-104</u>	Site Number : <u>299-W10-147</u>
N-Coord : <u>43,501</u>	W-Coord : <u>75,657</u>	TOC Elevation : <u>673.00</u>
Water Level, ft : <u>89.00</u>	Date Drilled : <u>2/28/1975</u>	

## Casing Record

Type : <u>Steel-welded</u>	Thickness : <u>0.237</u>	ID, in. : <u>4</u>
Top Depth, ft. : <u>0</u>	Bottom Depth, ft. : <u>95</u>	
Type : <u>Steel-welded</u>	Thickness : <u>0.280</u>	ID, in. : <u>6</u>
Top Depth, ft. : <u>0</u>	Bottom Depth, ft. : <u>100</u>	

Cement Bottom, ft. : 95      Cement Top, ft. : 0

## Borehole Notes:

Borehole 50-04-07 was drilled in February 1975 to a depth of 100 ft with 6-in. casing. In February 1981, the 6-in. casing was perforated from 0 to 20 ft and 93 to 95 ft. A 4-in. casing liner with a metal cap welded on the bottom was positioned inside the 6-in. casing to a depth of 95 ft. The open borehole below the bottom of the 4-in. casing and the entire annulus between the 4-in. and 6-in. casings was filled with grout. The thicknesses of the 4-in. and 6-in. casings are presumed to be 0.237 in. and 0.280 in., respectively, on the basis of the published thickness for schedule-40, 4-in. and 6-in. steel tubing.

## Equipment Information

Logging System : <u>2</u>	Detector Type : <u>HPGe</u>	Detector Efficiency: <u>35.0 %</u>
Calibration Date : <u>03/1995</u>	Calibration Reference : <u>GJPO-HAN-1</u>	Logging Procedure : <u>P-GJPO-1783</u>

## Logging Information

Log Run Number : <u>1</u>	Log Run Date : <u>04/05/1995</u>	Logging Engineer: <u>Dave Traub</u>
Start Depth, ft.: <u>95.0</u>	Counting Time, sec.: <u>100</u>	L/R : <u>L</u> Shield : <u>N</u>
Finish Depth, ft. : <u>63.0</u>	MSA Interval, ft. : <u>0.5</u>	Log Speed, ft/min.: <u>n/a</u>
Log Run Number : <u>2</u>	Log Run Date : <u>04/06/1995</u>	Logging Engineer: <u>Dave Traub</u>
Start Depth, ft.: <u>62.5</u>	Counting Time, sec.: <u>200</u>	L/R : <u>L</u> Shield : <u>N</u>
Finish Depth, ft. : <u>0.0</u>	MSA Interval, ft. : <u>1.0</u>	Log Speed, ft/min.: <u>n/a</u>



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### Logging Operation Notes:

This borehole was logged by the SGLS in two log runs with no depth overlap. Data from log run one were recorded at 0.5-ft increments using a counting time of 100 s. Data from log run two were collected at 1-ft intervals using a counting time of 200 s. Although increasing the counting time for log run two decreased the peak counting error, log run two may not have adequate spatial resolution to fully define the spatial peaks. The top of the borehole casing, which is the zero reference for the SGLS, is assumed to be flush with the ground surface. The total logging depth achieved was 95.0 ft.

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## Analysis Information

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Analyst : E. Larsen

Data Processing Reference : MAC-VZCP 1.7.9

Analysis Date : 01/06/1999

### Analysis Notes :

The pre-survey and post-survey field verification spectra showed consistent peak activities for both runs, but energy calibrations differed due to gain drift in the instrumentation. Spectra in the middle of both log runs were recalibrated for energy vs. channel. The energy calibration and peak-shape calibration from the accepted calibration spectrum that most closely matched the field data were used to establish the peak resolution and channel-to-energy parameters used in processing the spectra acquired during the logging operation.

This borehole was completed with 4-in.- and 6-in.-diameter casings along the entire logged interval. A casing correction factor for a 0.375-in.-thick steel casing was applied to the concentration data because it was the available correction factor that most closely matched the 0.517-in. total combined thickness of the 4-in. and 6-in. casings at the time of spectral processing. This may have resulted in slightly lower reported man-made and natural radionuclide concentration values. Furthermore, the entire annulus between the 4-in. and 6-in. casings is filled with grout, making it impossible to produce accurate radionuclide assays. However, man-made and natural radionuclides were identified and apparent concentrations are reported.

Approximately 6 ft of water has collected inside the bottom of this borehole. The appropriate water correction factor was not available so no compensation was applied, resulting in lower man-made and natural radionuclide concentration values along the water-filled interval.

### Log Plot Notes:

Separate log plots show the man-made and the naturally occurring radionuclides. The natural radionuclides can be used for lithology interpretations. The headings of the plots identify the specific gamma rays used to calculate the concentrations. Uncertainty bars on the plots show the statistical uncertainties for the measurements as 95-percent confidence intervals. Open circles on the plots give the MDL. The MDL of a radionuclide represents the lowest concentration at which positive identification of a gamma-ray peak is statistically defensible.

A combination plot includes the man-made and natural radionuclides, the total gamma derived from the spectral data, and the Tank Farms gross gamma log. The gross gamma plot displays the latest available digital data. No attempt has been made to adjust the depths of the gross gamma logs to coincide with the SGLS data.

### Results/Interpretations:



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The radionuclide concentrations identified in this borehole are underestimated and reported as apparent concentrations only.

The man-made radionuclide Cs-137 was detected by the SGLS. The Cs-137 contamination was detected continuously from the ground surface to 39 ft. Several small continuous zones and numerous isolated occurrences of Cs-137 were detected between 43 and 92 ft.

Most of the U-238 concentrations are absent between the ground surface and 16 ft. Many of the Th-232 concentrations are absent from the ground surface to 22 ft and from 69 ft to the bottom of the logged interval (95 ft).

The K-40 concentrations increase from 37 to 39 ft. Elevated U-238 concentrations occur from 79 to 91 ft. Decreased K-40 and U-238 concentrations occur between 91 ft and the bottom of the logged interval.

Additional information and interpretations of log data are included in the main body of the Tank Summary Data Reports for tanks T-104 and T-107.